



CLIMATE PROGRAM OFFICE

Ocean Climate Observation Program

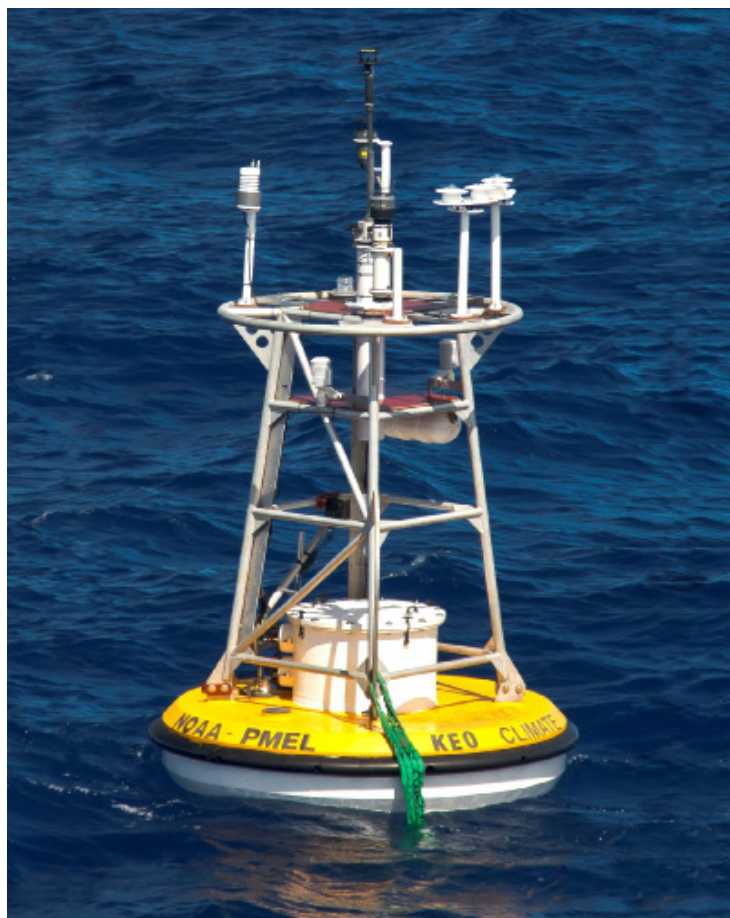
The ocean moderates global temperature and atmospheric carbon dioxide, and plays a critical role in sea level rise, drought, and tropical cyclones. How can we characterize the state of the global ocean in enough detail to understand its influence on climate variability and change?

The Ocean Climate Observation (OCO) Program sustains a global observing system to measure a range of important ocean parameters. With international partners, the program builds and maintains the in-water network of open-ocean observations around the world, contributing to the Global Climate Observing System and the U.S. Integrated Ocean Observing System. OCO supports the advancement of climate science by providing high quality observational data for the climate research, modeling, and forecasting communities. OCO also contributes to scientific climate assessments such as the Intergovernmental Panel on Climate Change (IPCC).

Every sector of society is affected by the ocean, either directly or indirectly. OCO provides benefits by delivering reliable observations that facilitate effective decision-making on climate-related issues. The OCO observing network also supports global and coastal weather and climate prediction, marine services, military applications, tsunami warning systems, and marine environmental monitoring. The majority of OCO's work is accomplished by partners in NOAA labs and Cooperative Institutes.

High quality ocean observation data required by climate scientists include:

- Global and basin-scale sea level changes and trends,



An ocean reference station provides long-term observations for climate.

- Ocean temperature and salinity to 2000m depth,
- Ocean currents and circulation,
- Ocean acidity,
- Ocean surface winds,
- Rate of air-sea exchange of carbon dioxide and ocean carbon absorption,
- Tropical ocean and atmospheric conditions important for weather and regional climate predictions and research, and
- Air-sea exchanges of heat and freshwater.

Ocean Climate Observation Program <http://www.oco.noaa.gov>

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Why do we need ocean observations?

The following examples illustrate some of the value that ocean observations provide in the ongoing study and monitoring of the global climate system:

- Observed global sea level is currently rising faster than projected by models used for the IPCC. Models will require observational data at higher spatial and temporal resolutions to dramatically improve their accuracy for the purposes of forecasting, mitigation, and adaptation.
- Monitoring surface ocean temperature to a high degree of accuracy is fundamental to predicting El Niño Southern Oscillation and other climate variations that impact regional weather and climate including drought in the western United States.
- Oceanic currents such as the Gulf Stream and the deeper Atlantic thermohaline currents are major components of the global ocean circulation, transport great amounts of heat, and shape the climate of several continental regions.
- Monitoring ocean salinity is necessary to track the evolution of marine ecosystems habitats, and to understand and monitor changes in global precipitation and evaporation.
- International policy and national economic decisions require accurate measurements of ocean-based sources and sinks of carbon dioxide.



The OCO supports ongoing work to build, maintain, and operate a range of interdependent observing networks, represented by symbols on the map above. From lower left to upper right, the photographs illustrate Dedicated Ships, Tide Gauge Stations, Arctic Observing Systems, Ocean Reference Stations, Ships of Opportunity, Tropical Moored Buoys, Surface Drifting Buoys, Argo Profiling floats, and Continuous Satellite Missions for sea surface temperature, sea surface height, surface vector winds, ocean color, and sea ice. Not illustrated are Data & Assimilation Subsystems and Product Delivery. Though satellites are a critical element of this composite system, they are managed by other programs in NOAA and NASA. The initial observing system is over one-half complete, measured against targets of the international Global Climate Observation System Implementation Plan. This current level is not yet adequate to meet growing requirements for accurate assessment and prediction of climate change.